

Morce's Gap, whose tropical conditions I have described above; close to Morce's Gap you make the ascent to John Crow Peak (6000 feet), through a forest of tropical luxuriance. Below is Mabess River (3000 feet), with similar but lower-level vegetation. At about the same distance from Cinchona (three miles) is New Haven Gap (5500 feet), with a similar but higher-altitude flora. Still higher altitudes are accessible at Portland Gap and Blue Mountain Peak at a distance of eight to ten miles.

"There are no human habitations above Cinchona, so that the Clyde River, which supplies it with water, is pure and without sources of contamination; a more healthful location could not be found in all the American tropics."

Briefly expressed, the above scheme offers the investigator residence accommodations and laboratory facilities at Cinchona under the most pleasant and advantageous conditions, from which place he may quickly transfer his work to more pronounced tropical conditions at Hope in a dry climate, or to Castleton in an extremely humid locality. The marine flora is equally accessible.

The locality furnishes easy access to an immense number of species of plants different from those available at any other similar institution; travelling and living expenses are very reasonable, and Jamaica may be reached at intervals of only a few days by numerous steamers from England, Germany (Hamburg), and nearly all ports of eastern America.

Yours sincerely,
N. L. BRITTON.

New York Botanical Garden, Bronx Park,
New York City, August 13.

Training of Forest Officers.

Is a sympathetic notice in the *Indian Forester* of the late distinguished Inspector-General of Forests in India, Mr. H. C. Hill, Sir Dietrich Brandis stigmatises as "absurd" "the idea which, until a short time ago, was current in England, and which to this day is held by many English botanists, that a good botanist must necessarily be a good forester." I quite agree that the idea is absurd; but as I am probably better acquainted with the English botanical world than Sir Dietrich Brandis, I doubt very much whether the idea was ever current in this country, or is held at the moment by many English botanists. For my part I entirely dissociate myself from it, as I know many accomplished botanists who would probably make very indifferent forest officers.

I am more able to agree with Sir Dietrich Brandis when he says, "A forester, more than almost anybody else, must use his eyes and must be able on the spot to draw conclusions from what he has observed." But the power of observation is by no means possessed by everyone. A further requisite, in which I think Sir Dietrich Brandis also agrees, is sympathy with and pleasure in forest nature for its own sake. It appears to me that neither point is kept in view in the present mode of recruiting the Indian Forest Service.

Sir Dietrich Brandis lays great stress on sport, and unless it becomes too absorbing a pursuit, it undoubtedly fulfils the conditions I have stated. It would, however, be as undesirable to insist that every forest officer should be a sportsman as that he should be a botanist.

But I entertain a very strong opinion that a forest officer will never rise to the highest level of efficiency in his work unless he has a scientific grasp of the principles which underlie it. He should be able to identify the trees which compose the forest vegetation under his charge, and for this purpose he should have such an elementary acquaintance with botany as will enable him to use intelligently the book which Sir Dietrich Brandis has been for several years occupied at Kew in preparing for the purpose. He should further have some knowledge of the nature and conditions of vegetable life; he should grasp the idea that a tree is a living organism the growth and development of which are subject to adverse or favourable conditions. He should further have some idea of the enemies and diseases by which trees are liable to be attacked, and of how these attacks can be met. All this a man of ordinary intelligence can acquire if he possesses a real taste for nature without rising to the

level of the professional botanist, which it would be absurd to demand of him.

There is the same fallacy underlying the view that mere administrative efficiency is sufficient for a good forest officer as in thinking that mere mechanical drill, without resource or initiative, will make a good soldier.

As I have felt it my duty to urge these views officially, I should be glad to state them more publicly.

I should like to take the opportunity of expressing my regret at the untimely death of Mr. H. C. Hill, the late Inspector-General. Largely as the result of my personal persuasion he accepted a mission in 1900 to initiate a scientific forest administration in the Straits Settlements. His reports were of the highest value, and will be a permanent basis for the future forest policy of that part of the Empire.

W. T. THISELTON-DYER.

Kew, August 28.

Peculiar Clouds.

CAN any of your correspondents explain the following phenomenon? At 5.20 p.m. to-day, the sky to the W. and S. being covered with a dense and unbroken mass of cloud, and the sun, therefore, entirely obscured, I saw a broad patch of iridescent colours like a piece of a rainbow on the clouds to N.N.E., many points more to N. than a rainbow would have been had the sun been shining. No part of the sky was clear, but the clouds were lighter in the N.W.

I saw a similar phenomenon at Colwyn Bay on December 17, 1898, the iridescent cloud being due E. at 2.45 p.m., the sun shining intermittently. I know true "iridescent clouds" well, but they are generally near the sun.

ALFRED O. WALKER.

Ulcombe, Maidstone, August 30.

THE EARTHQUAKE OBSERVATORY IN STRASSBURG.

NOW that the earthquake observatory in Strassburg has been offered as a centre for the proposed international association for seismological research, at which the work of the world so far as it bears upon earthquakes and kindred phenomena may be concentrated, a short description of this institution and its present output may not be devoid of interest.

The building stands in the back part of the University gardens, and lies between two streets, along which heavy traffic is forbidden. Externally it measures 19×15m., and essentially consists of four rooms, round the walls of which there is a passage or air space 1m. in width, walls, a second air space, and the outer walls. In short, it is a building with its floor 1.50m. below the surface, within two other buildings.

The object of the construction is to obtain rooms which are light tight, free from currents of air, and in which changes of temperature and moisture should be small. For certain classes of observations these conditions may be imperative, but when recording earthquakes, which is the chief work at Strassburg, gloom and a still atmosphere are distinctly undesirable. In the early days of seismometry the proper place for an earthquake recorder was considered to be a cellar, and when we find instruments with complicated parts which frequently require inspection, and which write their records on smoked paper, together with photographic apparatus designed to be used in broad daylight, relegated to darkness, we realise that traditions still survive.

Although it is well known that different results are obtained from similar instruments installed on different formations, the choice of site at Strassburg was apparently governed by the advantages offered by proximity to its University. In consequence of this, town traffic, which includes that of an electric service,

which might influence certain geophysical investigations, and the fact that alluvium might mask small tremors, are conditions that cannot be avoided.

In the *Beiträge zur Geophysik* (vi. Band, 3 Heft) issued "Zur Begrüssung der II. Internationalen Seismologischen Konferenz," Prof. Dr. Bruno Weigand gives an account of the instruments now in use at Strassburg Observatory, and an explanation of the monthly reports issued from the same.

The instruments longest in use are two Rebeur-Ehler horizontal pendulums. In each instrument there are three pendulums arranged at angles of 120° with each other, the idea being that the three records would enable an observer to determine the direction in which an earthquake motion was propagated. Inasmuch as it has been well known for many years past that the movement of the ground as recorded at a given station may be in any azimuth, we are not surprised when Dr. Weigand tells us that no satisfactory result has been obtained.

The records are photographic, the source of light and the record receiving surface being at a distance of 5 metres from mirrors on the pendulums. This necessitates the use of powerful electric lamps. This condition, the high sensibility due to high multiplication of the instrument, which on certain foundations leads to wandering of the light spot, and the cost of photographic paper, which is run at the rate of 36cm. per hour, preclude the use of this instrument excepting at a few selected stations. Other instruments are Wiechert's astatic pendulum, Vicentini's microseismograph, and Omori's conical pendulum, all of which write on smoked paper, Milne's photographic horizontal pendulum, which is a type adopted by the British Association, and Schmidt's trifilar gravimeter.

Brief references to the records of these instruments are published in a *Monatsberichte*. All that this gives about the Strassburg records of an earthquake is a time for its commencement and its duration as recorded by a Von Rebeur pendulum. The times of maximum or other phases of motion, amplitudes, periods, and other information required by seismologists is omitted. A plus or minus sign indicates whether other instruments did or did not respond to the movement, and the latter signs predominate.

With the object of showing the superiority of the Strassburg type of instrument, particularly as compared with the type adopted by the British Association, which latter, according to his opinion, should cease to exist, Dr. Weigand emphasises the discrepancies between his various registers. As illustrative of the supposed want of sensibility in the British Association type, he points out that the Strassburg *Circular* for August, 1901, shows that the Rebeur pendulum recorded twenty-four earthquakes, whilst a British Association type, in the same building, only recorded seven. This latter number he now raises to ten. As a matter of fact, seventeen of the Strassburg records correspond with seventeen records obtained in Britain, whilst five entries in the Strassburg list refer to very small disturbances peculiar to that place, which therefore may well be regarded as being of doubtful origin. The earthquakes recorded in a given period by the Rebeur and British Association pendulums were therefore nineteen and seventeen. Dr. Weigand published these numbers as twenty-four and seven, and similar discrepancies between the records of the Rebeur pendulum and the records of all other instruments in use at Strassburg appear in each of the Strassburg registers.

That the Rebeur pendulums as installed at Strassburg have a higher sensibility than other seismographs is well known, but it must not be overlooked that this high sensibility is one factor which prevents their

general adoption. That the British Association type of instrument is sufficient for the purposes for which it was intended is amply shown in the reports issued by the Association. Experiments are now in progress to increase the speed of the record receiving surface connected with this apparatus about four times, and to reduce the cost of photographic material to about 3l. per annum. It now costs 6l. 10s. per annum, whilst paper for the Rebeur apparatus costs 15l.

When Dr. Weigand complains of the want of sharpness in the trace yielded by the British Association instrument, he should evidently look to its adjustments, for it is its pronounced sharpness that compensates for its want of multiplication. In this respect the records it yields are far superior to those obtained from any other form of photographically recording seismograph.

That it should be affected like other instruments with so-called "Mikroseismische Unruhe" is what might be expected if located in a cellar.

Altogether, the institute at Strassburg as "der Kais. Hauptstation" might easily be improved, whilst if its publications took the form of the excellent registers issued in the *Bollettino della Società Sismologica Italiana*, they would be of greater value to working seismologists.

THE INTERNATIONAL STUDY OF THE SEA.¹

THE publications mentioned below are the first reports of the International Council for the Study of the Sea which was constituted by the meeting of representatives of the maritime Powers of northern Europe at Christiania in 1901, and now has its seat at Copenhagen. The bulletins deal with what has come to be known as hydrographic work carried out on the quarterly cruises, in which special ships of each of the participating States take part. The word hydrography is not, however, used in the sense made familiar by the hydrographic offices of the various Admiralties; it means, if we may borrow for a moment the terminology of chemistry, scarcely more than inorganic oceanography. We say scarcely more, for in these bulletins it does include the study of the distribution of plankton, but for this purpose plankton are treated rather as current-floats than as organisms.

It will be remembered that the International Council was formally constituted at a conference held at Copenhagen in July, 1902, and that no time was lost in getting to work is plain from the fact that the first number of the Bulletin deals with a series of cruises in August, 1902, the second with a similar series in November or December, 1902, and the third with February, 1903. These cruises have since been continued quarterly, and we understand that they are now more complete, and the results obtained more readily comparable than was possible when the collaboration was only beginning. Viewed from the standpoint of scientific efficiency, the work of the Council is hampered by the very short term for which the various Governments have granted the necessary funds and the stringent conditions as to endeavouring to obtain practical results directly beneficial to fisheries which have been insisted on in some cases. But there is reason to hope that these very difficulties will act as a spur.

The bulletins are mere records of observations, they contain a minimum of explanatory letterpress, and no discussion at all. It might be found desirable to print

¹ Conseil permanent international pour l'Exploration de la Mer. Bulletin des Résultats acquis pendant les courtes périodiques. Publié par le Bureau du Conseil avec l'assistance de M. Knudsen, Chargé du Service Hydrographique. Année 1902-1903. Nos. 1, 2 et 3. (Copenhague: A. F. Høst et Fils, 1903.)